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## The INFN MIRO (MInibeam RadiOtherapy) project for a systematic investigation of the minibeam effect

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The main parameters for minibeam that seem to affect the magnitude of the sparing effect are the peak/valley dose ratio, the FWHM and the distance between peaks. The quantitative dependencies of the minibeam effect on these parameters are not yet fully understood. Therefore, a systematic investigation of the variations of the biological effects in vitro and in vivo (small animals) as a function of the minibeam parameters would be of crucial importance for achieving a deeper understanding of the effect in the perspective of a future clinical translation.

The MIRO (MInibeam RadiOtherapy) project, recently funded by the INFN 5th Committee, aims to address various inquiries to assess the potential clinical implications of the minibeam effect. To accomplish this goal, the project brings together a team of over fifty researchers from diverse disciplines (beam delivery, dosimetry, radiobiology, computing) and will make use of two electron facilities (7-9 MeV at the CPFR in Pisa and 18 MeV at the Physics Department in Turin) and a proton one (at the Trento Proton Therapy Centre). The goals of the MIRO project are the following: i) to study the quantitative dependencies of the minibeam effect on the beam parameters (by creating flexible minibeam), ii) to understand the underlying radiobiological mechanisms with quantitative in-vitro/in-vivo experiments (using advanced fluorescence microscopy techniques) and theoretical modeling methods, iii) to develop a clinical protocol for minibeam (by developing a new dosimetric and developing new suitable dosimeters), iv) to study clinical perspectives for minibeam radiotherapy (by developing a radiobiological planning), v) to investigate possible synergistic effects with the FLASH effect, thanks to the possibility of combining the two approaches at a dedicated facility.

Beyond a project overview, the first dosimetric tests demonstrating the feasibility of combining both the minibeam and FLASH effects will be shown.

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